COMPLEX NUMBERS

LAST NAME	FIRST NAME	DATE

1 (4 points). Simplify the expression by taking the square root:

(a) $\sqrt{-100}$

(b) $\sqrt{81}$

(c) $\sqrt{-\frac{1}{25}}$

(d) $\sqrt{-0.64}$

2 (10 points). Simplify expressions and state answers in the form $a + bi$

(a) $(3 + 6i) + (7 + 14i)$

(b) $(5 - 3i) + (-2 - 4i)$

(c) $(-1 - i) - (2 - 3i)$

(d) $(5i)(2i)$

(e) $(3i)^2$

(f) $(2i)^3$

(g) $(5i)(4-i)$

(h) $(-i)(6i+3)$

(i) $(1+2i)(3+4i)$

(j) $(2-5i)(-7-6i)$

3 (4 points)**.** Let the sequence be defined as follows:

$$\begin{aligned} z_1 &= 0 \\ z_k &= z_{k-1}^2 + c \text{ if } k > 1 \\ c &= 2 + i \end{aligned}$$

Find the next four members of this sequence, and state them in the form $a + bi$:

(a) $z_2 =$

(b) $z_3 =$

(c) $z_4 =$

(d) $z_5 =$

4 (4 points)**.** Let the sequence be defined as follows:

$$\begin{aligned} z_1 &= 0 \\ z_k &= z_{k-1}^2 + c \text{ if } k > 1 \\ c &= -0.5 + 0.5i \end{aligned}$$

Find the next five members of this sequence, and state them in the form $a + bi$:

(a) $z_2 =$

(b) $z_3 =$

(c) $z_4 =$

(d) $z_5 =$

(e) $z_6 =$

PROBLEMS WITH ANSWERS.

In the following exercises, simplify each expression. Use the standard form $a + bi$ for stating the answers.

1. $(3 + 4i) + (-2 + i)$

2. $(-5 + 7i) - (4i - 9i)$

3. $5i(6 - 8i)$

4. $(-3 + 4i)(1 + 2i)$

5. $(2 + i)^2$

6. $(1 - i)(1 - 2i)(1 - 3i)$

7. i^{-2025}

8. i^{12345}

9. Find the value of the expression $2z^2 - 3z$ if $z = 1 - i$.

10. Find the value of the expression $1 - w + w^2$ if $w = -2 + i$.

11. Let the sequence a be defined as follows:

$a_1 = i$

$a_n = 2(a_{n-1} + 1) \quad$ for $n > 1$

Find a_4

12. Given $c = 5 - i$, let the sequence b be defined as follows:

$a_1 = 0$

$a_n = a_{n-1}^2 + c \quad$ for $n > 1$

Find a_4

In the following problems, simplify and state the answer in the standard form $a + bi$.

13. $\dfrac{-72 + 27i}{9i}$

14. $\dfrac{20 - 12i}{-4}$

15. $\dfrac{3 - 39i}{-6 - 7i}$

16. $\dfrac{-18 + 2i}{-2 - 2i}$

ANSWERS.

1. $1+5i$

3. $40+30i$

5. $3+4i$

7. $-i$

9. $-3-i$

10. $6-5i$

11. $14+8i$

12. $725-639i$

13. $3+8i$

15. $3+3i$